UNIFORM NUMBERING PLAN, AUTOMATIC ALTERNATE ROUTING, AND AUTOMATIC OVERFLOW TO DIRECT DISTANCE DIALING FEATURE DOCUMENTS "DIMENSION®" PBX

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INTRODUCTION

1. GENERAL INFORMATION

1.01 This section describes the Uniform Numbering Plan, Automatic Alternate Routing (AAR), and Automatic Overflow to Direct Distance Dialing (DDD) features as provided in the DIMENSION PBX. These are optional features initially provided in Feature Package (FP) 8. Refer to

Section 554-191-100 for the availability of these features in other feature packages.

1.02 This section is reissued for the following reasons.

(a) To include the capability for private network calls to main/tandem PBX stations numbered 0XXX (X is any digit 0 through 9) that overflows to DDD to route directly to the 0XXX station

(b) To change the attribute name "code conversion" to "prefix/area code conversion"

(c) To include the possible 10-Digit Conversion feature application for Automatic Route Selection—Deluxe (ARS—Deluxe) calls originated from AAR

(d) To include possible unauthorized call control of ARS—Deluxe calls originated from AAR.

Revision arrows are used to indicate significant changes.

2. DEFINITION

2.01 ***Uniform Numbering Plan:*** This feature permits station users at a DIMENSION PBX or main PBX to place calls over tie trunks using a uniform dialing plan. The user dials the AAR access code, followed by a uniform 4-, 5-, 6-, or 7-digit number which uniquely identifies each station. The uniform number consists of a 2- or 3-digit location code and a 2-, 3-, or 4-digit station code. Station users at tributary PBXs use the same plan with the exception of an additional access code. The feature provides the number translations and supervision necessary to route the call. When the same access code is followed by a 10-digit DDD number, the call is automatically routed via the ARS—Deluxe feature.

2.02 ***Automatic Alternate Routing (AAR):*** This feature provides automatic routing of tie trunk calls over up to four alternate trunk groups. Facilities are selected in descending order of desirability for placing a particular call. The AAR feature also provides a convenient means of placing International Direct Distance Dialing (IDDD) calls by allowing the assignment of private network numbers to specific foreign country locations.

2.03 ***Automatic Overflow to DDD (On-Net to Off-Net Overflow):*** This feature provides optional routing of private network calls via off-net facilities from a point on the network where all on-net (tie trunk) routes are busy or none are provided. Off-net facilities available include Wide Area Telecommunications Service (WATS), Foreign Exchange (FX), and/or Central Office (CO) trunk groups. The PBX selects the most preferred available route and converts the on-net destination code to either a Listed Directory Number (LDN) for attendant-seeking calls or to the Direct Inward Dialing (DID) (where appropriate) number for calls to a station. Off-net routes are listed in the AAR pattern. If no on-net routes are provided to a given destination, up to four off-net routes may be assigned.

DESCRIPTION

3. USER OPERATION

APPLICATIONS

A. Uniform Numbering Plan

3.01 The Uniform Numbering Plan feature is recommended for use in a multilocation network where DID is desired. Without uniform numbering, attendant assistance or more complicated dialing is necessary for calls to a network PBX. In small networks where only a few thousand stations exist, the Station Number Steering feature (Section 554-191-261) can be used to reduce the number of digits required to place an interlocation call.

B. Automatic Alternate Routing

3.02 The AAR feature improves private network performance by providing backup facilities (ie, the second, third, and fourth choice routes in the AAR pattern used when the first-choice route is busy) for peak demand periods.

3.03 An additional convenience is provided by allowing the user to dial on-net numbers to reach specific foreign country locations. These IDDD calls are made by dialing a 7-digit on-net number of the form RNX-XXXX, where RNX is the on-network office code and XXXX is the final four digits of the IDDD number. Using AAR, the call is routed on-net to a designated exit point. At the exit point the RNX is converted to the appropriate world zone, country, and city code. This code plus the final four dialed digits comprise the IDDD number.

C. Automatic Overflow to DDD

3.04 Automatic Overflow to DDD is useful when all on-net trunks are busy (or not provided) and the cost of an off-net routed call is justifiable.

GENERAL

A. Uniform Numbering Plan

3.05 A Uniform Numbering Plan provides each station user with a unique number which is identical in its format to all others in the network. An example of a Uniform Numbering Plan is shown in Fig. 1.

3.06 Table A and Table B are examples of numbering plans showing the originating station and destination station along with dialing requirements. While these tables only show 7-digit plans, 4-, 5-, and 6-digit arrangements can be used for smaller networks. A Uniform Numbering Plan can be used with both tandem tie trunk networks and private line networks. The basic format for the Uniform Numbering Plan is a flexibly assigned single-digit AAR access code (A) followed by a fixed-length on-net number (4- to 7-digits) or a 10-digit off-net number. The 10-digit off-net number must have the form: numbering plan area (NPA) code plus office code plus 4-digit station number.

3.07 ▶Some PBXs/switches (non-DIMENSION PBX) may have stations with address digits that begin with zero just as the attendant position. A main/tandem PBX that has stations numbered 0XXX (X is a digit 0 through 9) requires that the attendant be numbered 0111. (This includes 011 or 01 depending on the attendant code.) An attendant in a PBX that does not have stations numbered 0XXX is not required to be numbered 0111 (or, 011 or 01), but the address code must begin with zero.◀

B. Automatic Alternate Routing

3.08 The AAR feature can be activated by the following users when the corresponding code is dialed:

(a) Local PBX attendant (AAR access code "A" plus destination code)

(b) Local PBX station user ("A" plus destination code)

(c) Distant PBX attendant via a tie trunk (tie trunk access code plus "A" plus destination code)

Note: The AAR access code may be "inferred" for incoming tie trunks (see paragraph 9.01c).

(d) Distant PBX station user via a tie trunk (tie trunk access code plus "A" plus destination code)

(e) Remote access user (remote access number plus "A" plus destination code).

The destination code is the uniform number associated with the called party. The call is routed according to the RNX. The system translates the RNX into one of up to 180 patterns.

3.09 Each pattern contains four possible routes. A first-choice route and up to three alternate routes arranged in order of preference for routing the call. Each route in the pattern is assigned a trunk group and a Facility Restriction Level (FRL). The FRL is a parameter used to form a degree of accessibility to the route. Each station line, incoming tie trunk group, and remote access trunk has an FRL associated with it (called the default FRL). Attendant console positions, as a group, also have a specific default FRL. The default FRL of the local station user is the FRL assigned to the station in its line class of service. An intertandem call uses the default FRL assigned to the incoming tie trunk group of the AAR equipped PBX. Remote access users have the default FRL assigned to the trunk that accesses the PBX. Local attendants use the default FRL (this FRL is used for attendant originated and assisted calls). In certain instances, the user may be permitted to use other FRL values. These instances are described in the following paragraphs as they are encountered.

3.10 When a user accesses AAR, the default FRL of the user facility is compared to the FRL of the first-choice route in the dialed pattern. The user FRL must be equal to or greater than the FRL of the route in order for the route to be accessible. If accessible, the trunk group of the route is checked for idle trunks. If the first-choice route has no idle trunk, alternate routes are checked. When an accessible route with an idle trunk is located, the call continues routing.

3.11 There are cases when the user default FRL is too low to allow access to an idle trunk. Normally when this happens, the call must be redialed (see paragraph 3.18, User Operating Procedures for

Basic Format

A + 4 to 7-Digit = On-net number.
A + 10-Digit Off-net number.

Dialing Format and Response

Dial tone.
AAR access code "A".

Dial tone.
SMDR (account) code – optional.
4- to 7-digit on-net number, or 10-digit off-net number

Recall dial tone, if required.
4- to 7-digit Authorization code – optional.

Codes

AAR access code "A" = single-digit feature access code.

SMDR code = BNXX(XX).
SMDR codes are all the same length in a given system. They may be 3, 4, or 5 digits in length, not including the initial fixed digit (B).

On-net station number = RN(X)–X°X(XX).
On-net attendant number = RN(X)–ØX(XX).
Off-net number NPA code (N 0/1 X) + office code (NNX) + XXXX
Authorization code = X¹XXX(XXX).
Decline authorization code = 1.

Definitions

A = Typically any digit 2 thru 9.

B = Single-digit account code prefix. This digit is fixed and is not used as the first digit of a location code.

X = Any digit Ø→ 9.

X° = Any digit except Ø.
X¹ = Any digit except 1.
N = Any digit 2 thru 9.
R = Any digit 2 thru 9 except for a reserved digit, or the SMDR account code prefix (if assigned in procedure 285).

Fig. 1—Uniform Numbering Plan

TABLE A

NUMBERING PLAN I (SEE NOTE 1)

No. DIGITS: 4__ 5__ 6__ 7✓

FROM \ TO	STATION ON TANDEM PBX	STATION ON MAIN PBX	STATION ON SAT. OR TRIB PBX	DDD —HNPA	DDD —FNPA OR IDDD (SEE NOTE 2)
Station on Tandem PBX	Should not use network	+8+RNX—XXXX	+8+RNX—XXXX	+9+7 digits or +8+10 digits	+9+10 digits or +8+10 digits
Station on Main PBX	+8+RNX—XXXX	Should not use network	+8+RNX—XXXX Main/tributary call can use tie trunks if directly connected	+9+7 digits or +8+ 10 digits	+9+10 digits or +8+10 digits
Station on Sat. or Trib PBX	+X±8+RNX—XXXX	+X±8+RNX—XXXX Main/tributary call can use tie trunks if directly connected	+X±8+RNX—XXXX	+9+7 digits or +X±8+10 digits	+9+10 digits or +X±8+10 digits
DDD Network Remote Access	DDD Number +Barrier code +8+RNX—XXXX*	DDD Number +Barrier code +8+RNX—XXXX*	DDD Number +Barrier code +8+RNX—XXXX*	DDD Number +Barrier code +9+7 digits or +8+10 digits	DDD Number +Barrier code +9+10 digits or +8+10 digits

Notes:

1. + = Dial tone
   — = No dial tone
   ± = Dial tone or no dial tone depending on the tributary PBX type
   HNPA = Home Numbering Plan Area
   N = Any digit 2-9
   X = Any digit 0-9
   R = Any digit 2-9
   8 = Example of network code for AAR call
   9 = Example of network code for off-net ARS call
   FNPA = Foreign Numbering Plan Area
2. AAR also allows the user to reach specific foreign country locations (IDDD) by dialing on-net numbers.

* The Barrier code is optional in some feature packages.

TABLE B

NUMBERING PLAN II (SEE NOTE 1)

No. DIGITS: 4__ 5__ 6__ 7✓ AUTHORIZATION CODE✓ SMDR CODE✓

FROM \ TO	STATION ON TANDEM PBX	STATION ON MAIN PBX	STATION ON SAT. OR TRIB PBX	DDD —HNPA	DDD —FNPA OR IDDD (SEE NOTE 2)
Station on Tandem PBX	Should not use network	-8+3—SMDR +RNX—XXX #AUTH	+8+3—SMDR +RNX—XXX #AUTH	+9+7 digits or +8+3—SMDR +10 digits #AUTH	+9+10 digits or +8+3—SMDR +10 digits #AUTH
Station on Main PBX	+8+3—SMDR +RNX—XXXX #AUTH	Should not use network	+8+3—SMDR +RNX—XXXX #AUTH Main/tributary call can use tie trunk if directly connected	+9+7 digits or +8+3—SMDR +10 digits #AUTH	+9+10 digits or +8+3—SMDR +10 digits #AUTH
Station on Sat. or Trib PBX	+X±8+3—SMDR +RNX—XXXX #AUTH	+X±8+3—SMDR +RNX—XXXX #AUTH Main/tributary call can use tie trunk if directly connected	+X±8+3—SMDR +RNX—XXXX #AUTH	+9+7 digits or +X±8+3—SMDR +10 digits #AUTH	+9+10 digits or +X±8+3—SMDR +10 digits #AUTH
DDD Network Remote Access	DDD Number +Barrier Code +8+3—SMDR +RNX—XXXX #AUTH*	DDD Number +Barrier Code +8+3—SMDR +RNX—XXXX #AUTH*	DDD Number +Barrier Code +8+3—SMDR +RNX—XXXX #AUTH*	DDD Number +Barrier Code +9+7 digits or +8+3—SMDR +10 digits # AUTH*	DDD Number +Barrier Code +9+10 digits or +8+3—SMDR +10 digits # AUTH*

1. + = Dial tone
   — = No dial tone
   ± = Dial tone or no dial tone depending on the tributary PBX type
   AUTH = Authorization code
   SMDR = SMDR prefix digit and account number
   HNPA = Home Numbering Plan Area
   N = Any digit 2-9
   X = Any digit 0-9
   R = Any digit 2, 4-9
   8 = Example of network code for AAR call
   9 = Example of network code for off-net ARS call
   FNPA = Foreign Numbering Plan Area

2. AAR also allows the user to reach specific foreign country locations (IDDD) by dialing on-net numbers.

* The Barrier code is optional in some feature packages.

more detail). However, the DIMENSION PBX can be administered so that the user has a second chance to complete the call. The PBX requests an authorization code from the user. By dialing a valid authorization code, the user substitutes the default FRL with the FRL associated with the authorization code. The authorization code FRL is then used during a second attempt at accessing an idle trunk. If neither the default FRL nor the authorization code FRL allows the user to access a route in the pattern, the call is denied. When the first-choice trunk group is accessible and deluxe queuing is available, the call may be queued on the first-choice trunk group. Otherwise, intercept tone is returned to the calling party.

3.12 If an authorization code is required for access to PBX facilities from a remote access station, an authorization code is not requested again while the remote access call is routing. The call completes if the FRL or alternate FRL of the remote access authorization code is equal to or greater than the FRL of the outgoing route. Otherwise, the call is denied. If queuing is provided and the call's FRL permits access to the first-choice trunk group, the call is placed in queue on the first-choice route.

3.13 If the user default FRL allows the user access to all routes in the pattern, an authorization code FRL would not provide additional access. In this case, an authorization code is not requested.

3.14 If an authorization code is not known, the user may dial "1" or wait 10 seconds for time-out to cancel the authorization code request. In this case, the user default FRL is used again during the second attempt.

3.15 The attendant has the ability to invoke a set of alternate FRLs. By depressing the AFRL button on the attendant console (console lamp lights), the default FRLs are replaced with alternate FRLs. The attendant depresses the AFRL button again (console lamp extinguishes) to reinvoke the default FRLs.

3.16 The customer may optionally (per trunk group) require an authorization code on all AAR calls that use the designated incoming trunk group. In this case, an authorization code must be dialed and the authorization code FRL is used for call processing. Not dialing an authorization code or dialing "1" when an authorization code is required on all calls results in intercept treatment.

3.17 Up to 9000 authorization codes may be assigned in the DIMENSION PBX. This allows each station user to have a unique authorization code, if desired. When the Station Message Detail Recording (SMDR) feature is provided, the authorization code is displayed in the SMDR output.

3.18 ▶A 10-digit number (NPA-NNX-XXXX) dialed after the AAR access code routes via ARS—Deluxe except when the number is subject to 10-digit conversion or unauthorized call control. If applicable, the 10-Digit Conversion feature replaces the NPA-NNX of the 10-digit number with an RNX for AAR. The RNX and original address digits (xxxx) route via AAR. If the dialed number is call controlled, an authorization code is requested. Refer to Section 554-191-226 for more information about ARS—Deluxe and 10-Digit Conversion.◀

3.19 Dial "0" and "01X" AAR/ARS—Deluxe calls are directed off-net to local and international operators, respectively. The interdigital timing for dial "0" and "01X" calls changes from 10 seconds to 4 seconds once "0" is dialed. ▶The 4-second interdigital timing reduces the time-out to the local operator. The user may otherwise dial "#" for end-of-dialing. A second digit dialed causes interdigital timing to become 10 seconds again for the rest of dialing.◀

C. Automatic Overflow to DDD

3.20 The Automatic Overflow to DDD feature is actually a special case of the AAR feature which occurs when the AAR routing pattern contains an off-net route. When the off-net AAR route is chosen, the Automatic Overflow to DDD feature converts the on-net number to the LDN or DID number, as applicable, of the distant location and routes the call off-net. An optional 1-second, 440-Hz warning tone to advise the calling party of the off-net routing can be provided for the off-net route. When routing off-net, the call may go to the station dialed (via DID), to the attendant at the called location, to a station at an IDDD location, or to the attendant at an IDDD location.

USER OPERATING PROCEDURES

A. Automatic Alternate Routing

3.21 ***Station Access to AAR:*** A station user performs the following steps when accessing AAR:

(1) Go off-hook.

- Dial tone is returned.

(2) Dial AAR access code plus a uniform 4- to 7-digit number.

- Dial tone removed after first digit dialed; and,
- Recall dial tone returned, authorization code requested, proceed to Step (3); otherwise,
- Call progress tone (eg, ringback tone or busy tone) is returned whenever the default FRL is adequate to allow the call to proceed and an idle trunk is available; or,
- Intercept tone returned; the calling station is outward restricted or dialed an invalid code or destination number; or,
- Confirmation tone returned; the call is placed in ringback queue, and the calling party is being requested to either go on-hook (the calling party is at the local main PBX) or to dial in the calling party extension number and then go on-hook (the calling party is at a remote PBX). (See paragraph 7.02.) The calling party is rung back when a trunk becomes available; or,
- Audio (recorded announcement or music-on-hold) or silence is returned; the call is placed in off-hook queue until a trunk becomes available.
- Reorder tone is returned; the default FRL is high enough to allow the call to proceed, but an idle trunk is not available and the queue is full or not provided.

(3) When recall dial tone is received, dial an authorization code within 10 seconds. If the user is not assigned an authorization code, dial "1" to cancel the 10-second timer or let the timer time-out (details on dial "1" and the 10-second timer are discussed in paragraph 3.14). If an authorization code is dialed, the system responses are:

- Dial tone removed after first digit dialed; and,
- Call progress tone (eg, ringback tone or busy tone) is returned whenever the authorization code FRL is adequate to allow the call to proceed and an idle trunk is available; otherwise,
- Confirmation tone returned. The call is placed in ringback queue. The calling party is being requested to either go on-hook (the calling party is at the local PBX), or to dial in the calling party extension number and then go on-hook (the calling party is at a remote PBX). (See paragraph 7.02.)
- Audio (recorded announcement or music-on-hold) or silence is returned. The call is placed in off-hook queue until the trunk becomes available.
- Reorder tone is returned when the authorization code is adequate to allow the call to proceed but an idle trunk is not available and the queue is full or not provided.
- Intercept tone is returned whenever the call is not allowed to proceed due to an invalid authorization code, or inadequate authorization code FRL.

4. SYSTEM OPERATION

GENERAL

4.01 The network architecture within which AAR operates is known as a private network. An example of a private network with uniform numbering is shown in Fig. 2. A private network can be either a hierarchical network or a symmetrical network. A diagram is shown in Fig. 3.

4.02 A hierarchical network has the following characteristics:

(a) A level is assigned to each tandem point (node) on the network.

(b) High-usage trunk groups are established between nodes with a high traffic rate.

(c) A final trunk group (route) is established to the next higher level node or to all other nodes at the highest level.

(d) Circular routing is not used in the network.

4.03 A symmetrical network has the following characteristics.

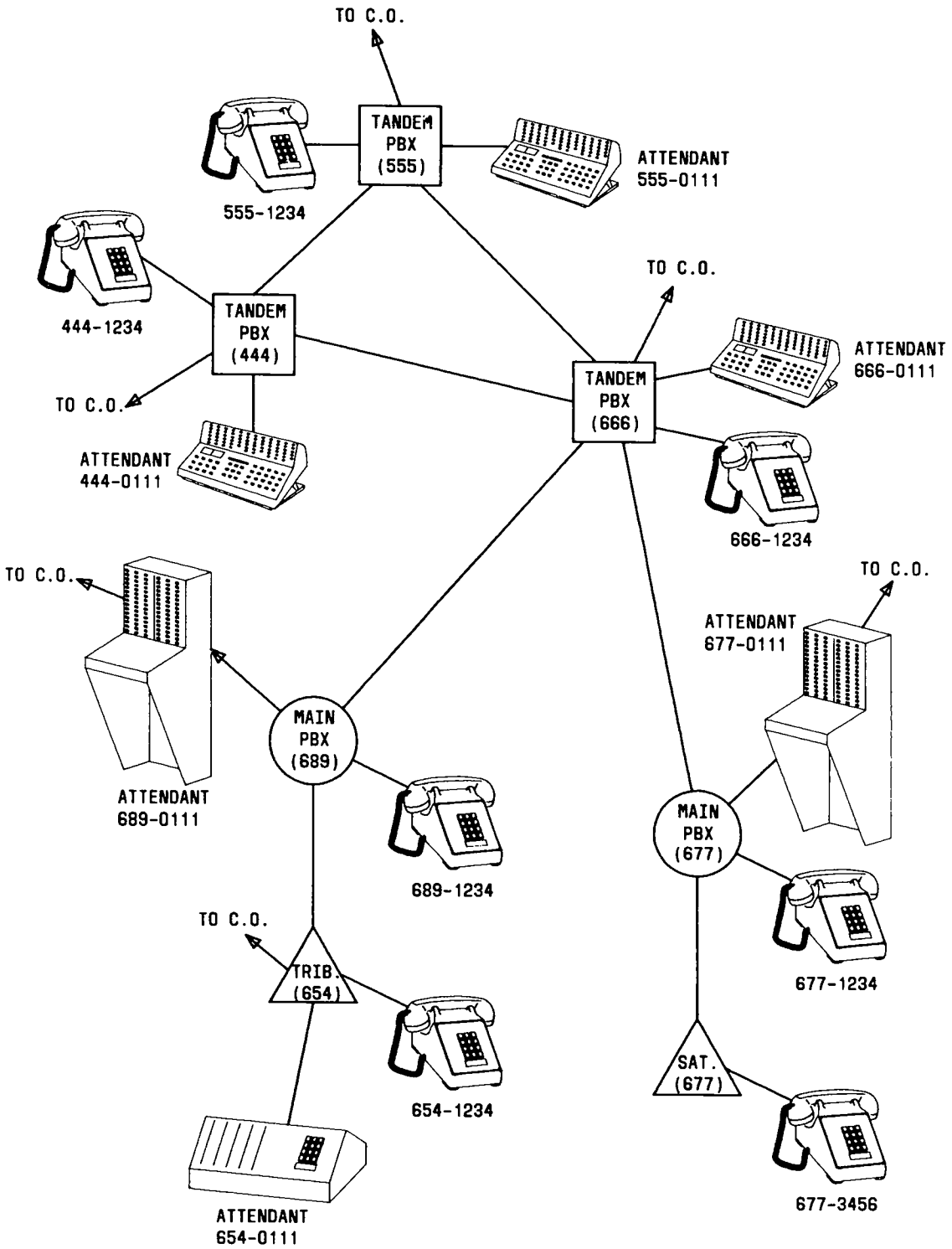
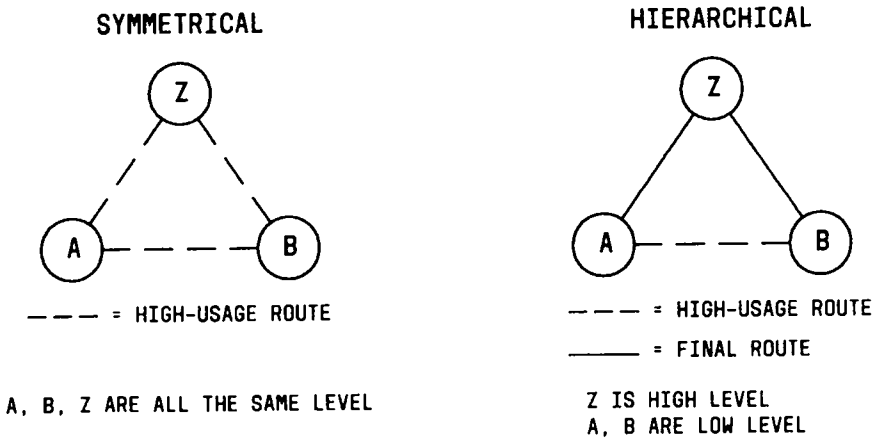


Fig. 2—Private Network With Uniform Numbering Plan



COMPARISON OF ROUTES BETWEEN NODES

FROM	TO	SYMMETRICAL ROUTES	HIERARCHICAL ROUTES
A	B	1	2
A	Z	1	1
B	A	1	2
B	Z	1	1
Z	A	1	1
Z	B	1	1

Fig. 3—Comparison of Hierarchical and Symmetrical Network

(a) All nodes are of an equal level.

(b) All trunk groups are high-usage trunk groups.

(c) Circular routing is prevented by limiting tandem-to-tandem routing to the first-choice trunk group in the selected pattern.

4.04 The AAR feature is based on the Uniform Numbering Plan. A flow diagram of AAR is shown in Fig. 4. A station user places an AAR call by dialing the following components of the number in the order listed:

(1) The AAR access code

(2) The SMDR account code (this is optional)

(3) An on-net or off-net number based on the Uniform Numbering Plan

(a) A 4- to 7-digit on-net number or

(b) A 10-digit off-net number.

(4) An authorization code if required.

Note: The calling party may receive confirmation tone requesting that the calling party extension number be dialed so the call can be placed in ringback queue. (See paragraph 7.02.)

CALL PROCESSING DESCRIPTION

4.05 When an AAR equipped PBX receives the AAR access code, either dialed by the user or

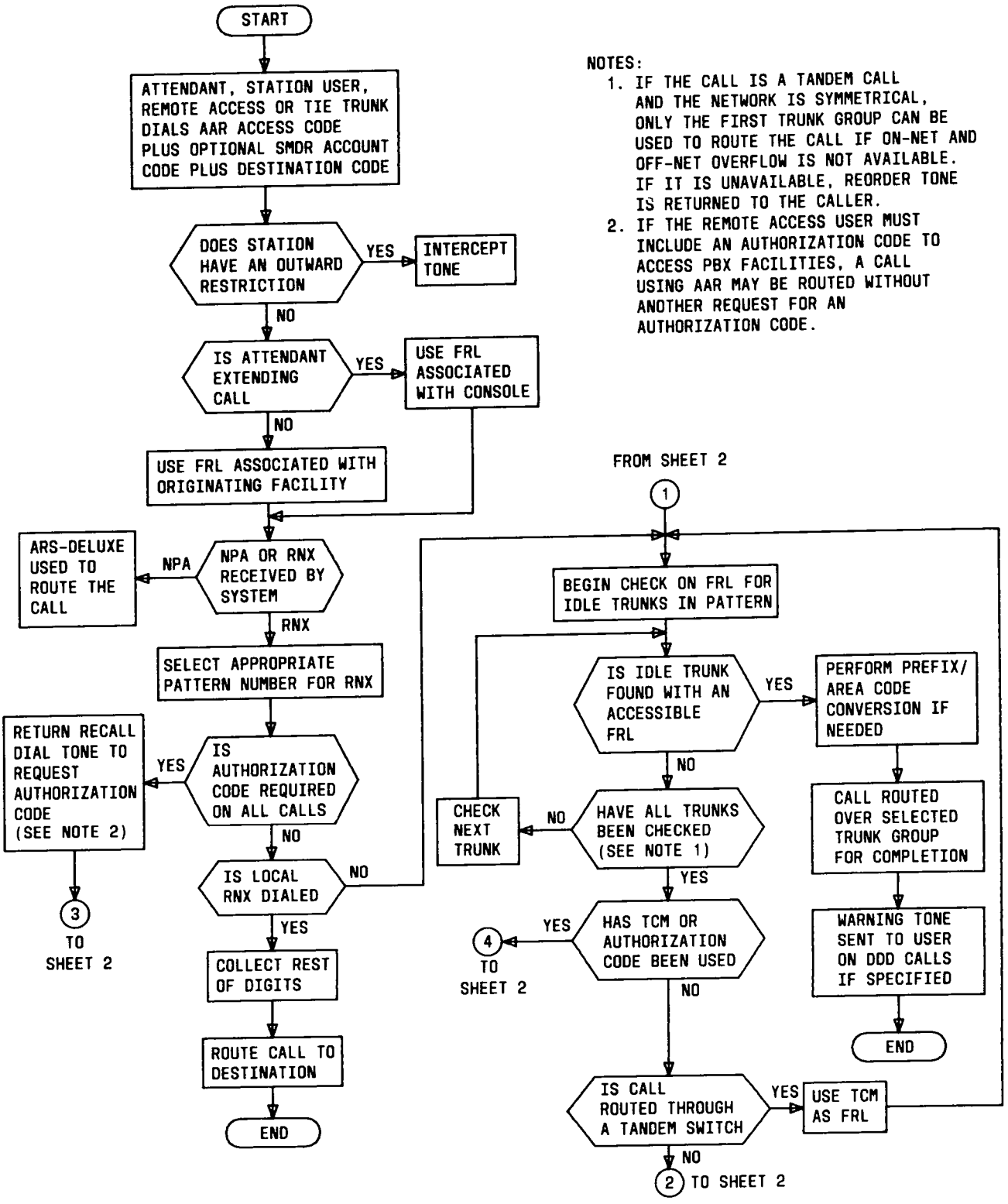


Fig. 4—Automatic Alternate Routing—Flow Diagram (Sheet 1 of 2)

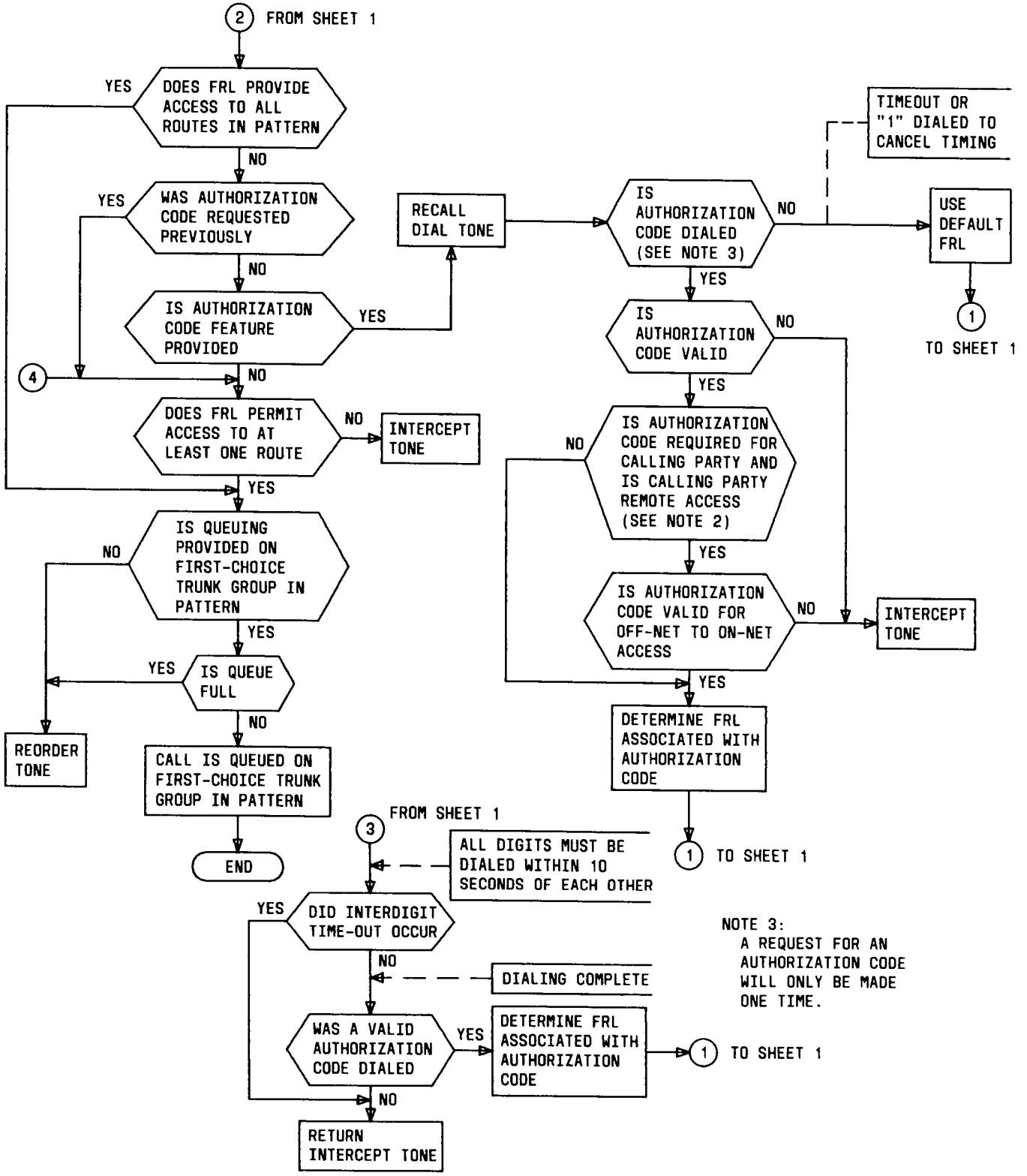


Fig. 4—Automatic Alternate Routing—Flow Diagram (Sheet 2 of 2)

"implied" when an incoming tie trunk is used [see paragraph 9.01 (c)], AAR is activated. The AAR feature is prepared to receive an on-net number, off-net number, or an SMDR account code followed by an on- or off-net number (SMDR provided). As the PBX checks the digits received, the type of number is determined within the first two digits following the AAR access code. The difference between an RNX code and an NPA code distinguishes an on-net number from an off-net number, respectively. Also, an SMDR prefix digit cannot coincide with the first digit of any location code in the network uniform numbering plan. Thus, an on-net number is distinguishable from an SMDR on- or off-net number. An off-net number (with NPA code) and an SMDR number are distinguishable because the first digit of an SMDR account code (the digit following the SMDR prefix digit) is limited to a digit from 2 to 9. The AAR feature routes the call and, if the call uses SMDR, call data is recorded. (Refer to Fig. 4 for code and digit definitions).

A. On-Net Numbers

4.06 The AAR feature examines the RNX code dialed at an originating facility or arriving on an incoming tie trunk or tandem tie trunk at a main/tandem PBX. The feature then selects the appropriate pattern number based on the RNX, and routes the call accordingly. If the RNX dialed is unassigned, pattern 1 is assumed and the call is routed to intercept. Each pattern contains up to four possible routes to be used for placing the call. The last-choice route may take the call off-net. In this case, insertion-deletion routines are used to modify the dialed number to a public network number. If an IDDD route is specified, it is usually the only route in the pattern.

4.07 Off-net overflow is permitted at any tandem point in either a hierarchical or symmetrical network. In a symmetrical network, alternate off-net routes are permitted only at the first tandem point in the connection to prevent circular routing.

4.08 An FRL is assigned to all attendants and to each station line, incoming tie trunk group, tandem tie trunk, and remote access trunk group. Whenever an AAR call is originated, the originating DIMENSION PBX compares the FRL of the originating facility (station, remote access trunk group, etc) to the FRL(s) of the routes in the routing pattern. If the FRL of the originating facility is high enough to allow routing over a trunk group in the pattern, and the trunk group is defined in translation as a network tandem trunk, the FRL of the originating facility is appended to the dialed digits as a traveling class mark (TCM). However, if the FRL of the originating facility is not high enough to allow routing over a trunk group in the routing pattern, the originating PBX returns recall dial tone to the originating facility, requesting an authorization code, when the authorization code option is provided. The originating party may dial an authorization code, wait for a time-out, or dial a "1" to cancel the timing period.

4.09 When an authorization code is dialed, the FRL associated with the authorization code is compared to the FRLs of the routes in the routing patterns in a second attempt to route the call. The FRL associated with the authorization code is used as the TCM. Time-out or dialing "1" results in a second attempt to route the call using the originating facility's assigned (default) FRL. A request for an authorization code is only made once to the user during any given call. An AAR dial "0" call is translated as an ARS—Deluxe call to an off-network operator. Dial "0" and "01X" calls may require an authorization code if the call is directed on a trunk group that requires the authorization code, or a higher FRL is needed to complete the call. If an authorization code is required when a remote access call accesses PBX facilities, no further request for an authorization code is made. The call routes on the remote access authorization code. Authorization codes are always requested on any other calls from trunks marked as requiring authorization codes. (These include remote access calls that are initiated with an authorization code, and attendant extended calls.)

4.10 Once the originating PBX has translated the originating facility's FRL or the authorization code into a TCM, that TCM remains with the routed call information as long as the call is being routed on-net over tandem tie trunks.

4.11 When a call is routed through several PBXs, each DIMENSION PBX encountered during on-net routing compares the routed digits of the AAR call with its own AAR routing pattern. If the FRL of an incoming network tandem trunk is sufficiently high to allow routing of the call over one of the trunk groups in the routing pattern, routing is continued. However, if the FRL of the incoming tandem trunk is not high enough to allow routing, the TCM of the AAR call is checked to see if its associated FRL allows routing.

4.12 At the originating PBX, if all routes (to which a call's FRL allows access) are busy, and if a

higher FRL for the station would allow access to more routes, then recall dial tone is returned to the calling party. A second attempt at routing is then made using the FRL associated with the dialed authorization code or using the default FRL if no authorization code is dialed. If the call still cannot complete, a check is made to determine if the FRL allows access to at least the first-choice route. When access to one route is allowed, an attempt is made to queue the call on the first-choice trunk group (using deluxe queuing). If the FRL does not allow access to at least one route, then intercept tone is returned to the calling party. Reorder tone is returned if queuing is not provided, or the queue provided if full. An authorization code is not requested when a call's FRL allows access to all routes in the routing pattern. A higher FRL would not provide any additional access. In all other situations an authorization code is requested (at an originating PBX) before queuing is attempted. Additional information about Deluxe Queuing may be obtained from Section 554-191-164.

4.13 Once a trunk group has been selected at an originating PBX and code conversion completed, if required, the call is routed to either the appropriate destination, to a tandem switch, or off-net. When the location code indicates the call is to be routed to a tandem switch, the best (lowest preference number) available route is selected from the appropriate trunk group. A trunk to that tandem switch or an alternate tandem switch is seized. The dialed number is outpulsed as dialed and appended with a TCM. The AAR access code may be outpulsed or deleted, depending on the particular network. The TCM is derived from the FRL of the originating facility or from an authorization code.

4.14 At the next tandem switch, the default FRL of the incoming tandem trunk is compared to the FRL of the routes in the AAR routing pattern to determine if routing is allowed. If the FRL of the route selected is not high enough to allow routing, the FRL associated with the TCM is used in making a second comparison. If all available routes are busy, queuing is attempted. This procedure continues from tandem to tandem as the call is routed on-net.

4.15 ▶A call from a tandem PBX to an attendant at a main/tandem PBX with stations numbered 0XXX is sent in its complete 4-, 5-, 6-, or 7-digit form. A tandem PBX sends only the digit "0" for attendant seeking calls to a main PBX that has no 0XXX stations. An attendant at a main/tandem PBX with stations numbered 0XXX must have address digits 0111 (or, 011 or 01).◀

B. Subnet Trunking

General

4.16 Digit modification for off-net routing is accomplished on a per-route basis via an attribute of AAR called subnet trunking. Subnet trunking is used whenever Procedure 103, field 3 contains a 0 or when field 3 contains a 1 and field 4 contains a 0. Subnet trunking is typically used when routing a call from a tandem PBX to a main PBX, when alternate routing over public network facilities, or when placing an IDDD call.

4.17 Subnet trunking may be used for both on-net and off-net routes. Typically, the first-choice route does not use subnet trunking. The call is routed over a network tandem (intertandem) trunk directly to another PBX where the call terminates. A second-choice route may take the call to an intermediate PBX where the call tandems through to the final PBX. Both of these routes (first- and second-choice) are defined as on-net. Procedure 321, Word 1, field 6 must be "0" for on-net. The first route does not use subnet trunking; the second route may or may not use subnet trunking, depending on the type of PBX at the intermediate point. If the intermediate PBX is an FP8 PBX, the call tandems through with no digit modification. If the intermediate PBX is other than an FP8 PBX, subnet trunking would probably be invoked to replace the RNX digits with a tie trunk access code. A third-choice route could be an off-net route using public network facilities. Subnet trunking would be used to replace the RNX with area/office code digits.

4.18 Subnet trunking provides the following capabilities:

- Digit insertion and deletion
- Digit grouping and pauses between groups of digits
- Outpulsing rotary digits or TOUCH-TONE® service digits
- Digit format when attendant is dialed.

4.19 The subnet trunking attributes are not accessible when the route is defined as a network

tandem (Procedure 103, fields 3 and 4 each contain 1). In this case, the digits are sent as dialed (RNX plus XXXX). This is called an on-net route. The call may terminate at the end of this route or may tandem to another PBX. This discussion is based on the definition of the dialed RNX. If the RNX is defined as the "home RNX", the call terminates on a local station or attendant. If the RNX is not defined as the "home RNX", a tandem route is selected to complete the call. A TCM is sent only when the chosen route is defined as a network tandem.

4.20 Subnet trunking for AAR allows a maximum of 12 digits to be inserted before the dialed digits. In addition, up to seven of the dialed digits may be deleted, starting with the first digit dialed. The system can outpulse up to 16 digits.

4.21 For each off-net route, the following must be provided:

(1) The trunk group to be used.

(2) Conversion required for the digits deleted and digits inserted.

(3) Programmed pauses (used in sending) inserted ahead of the first digit and between sets of inserted digits. The first pause can be from 2 to 16 seconds in duration (2-second increments). Remaining pauses can be from 0 to 16 seconds in duration (also 2-second increments). A pause can be canceled (dc signal ignore field of Procedure 321) by receiving a wink start, delay dial, immediate start, or precise dial tone signal from the receiving PBX.

> ***Note:*** Precise dial tone from the receiving PBX is detected by a circuit contained in the LC12 TOUCH-TONE calling sender/dial tone detector. If prefix/area code conversion or subnet trunking is used extensively, additional LC12 circuit packs may be required.

(4) The type of senders, whether TOUCH-TONE calling senders or dial pulse senders to be used for each set of digits.

(5) Whether or not a warning tone is provided when routing off-net.

(6) The FRL assigned to the route.

Off-Net Calls

4.22 When the system determines that the route is an off-net route (Procedure 321, Word 1, field 6 contains a 1), the system makes the assumption that the LDN (or assigned station number) resides in translation as the last four digits of the inserted digits (following the required area/office code). The system checks the first digit of the last four dialed digits to determine if it is a zero, indicating a possible call to the attendant at the distant location. ⧫If no 0XXX stations exist at the destination, the zero address code is replaced with the LDN for the attendant and the area/office code is inserted. However, all four digits of a station or attendant address code that begins with zero are required when routing to a PBX with 0XXX stations. The system only inserts the area/office code needed and sends the complete number to the destination PBX. An address code that does not begin with zero (station call), requires only that the RNX be replaced by an area/office code.⧫ Whenever the destination location does not have DID, the subnet trunking translations must be built to always delete the seven dialed digits and to insert the area/office code and the LDN for the attendant. All calls to a non-DID location are attendant-seeking calls regardless of the dialed number.

IDDD Off-Net Calls

4.23 The ability to dial international numbers via AAR (RNX plus XXXX) is provided as a convenience to the customer. The IDDD route is always a first-choice route. When the system determines that the route is an IDDD route (Procedure 321, Word 1, field 6 = 2), the dialed station or attendant number (the XXXX of the RNX-XXXX) is left intact. The RNX is replaced by up to 12 digits (inserts) which are the necessary prefixes and codes for the overseas-serving central office (CO). The station or attendant address digits remain unchanged and the entire number (up to 16 digits) is outpulsed.

CHARACTERISTICS

5. FEATURE ASSIGNMENT

5.01 These features are administered on a per-system basis via the Maintenance and Administration Panel (MAAP). Limited administration is permitted via the Customer Administration Panel (CAP) and the Customer Administration Center System (CACS). The MAAP and CAP procedures are

described in Part 9. Refer to Section 554-191-169 for the CACS procedures.

6. LIMITATIONS

6.01 The AAR feature is limited to a maximum of 180 patterns, each containing a maximum of 4 routes (called "preferences") per pattern. Pattern number 181 defines the home location code. Pattern 1 is used for intercept treatment of unassigned RNX codes.

6.02 TOUCH-TONE calling senders are required when subnet trunking is used because the LC12 also contains the precise dial tone detector used for canceling the pause before the sender times out. If no LC12 is available, the calling party receives reorder tone.

6.03 If the destination PBX does not have DID, the subnet trunking translations must be built to always delete the seven dialed digits and to insert the area/office code and the LDN for the attendant. All calls to a non-DID location are attendant-seeking calls regardless of the dialed digits.

7. INTERACTIONS

7.01 The features in the following paragraphs interact with AAR.

7.02 ***Deluxe Queuing:*** Queuing must be administered for the first-choice trunk group in the pattern. When all trunk groups available to the originating station are busy and queuing is provided, the call is placed in queue on the first-choice trunk group. A station at a remote PBX making a call through the local PBX can be placed in the ringback queue. If all the trunks in the AAR pattern at the local PBX are busy and ringback queuing is provided, the remote PBX call is placed in queue. However, if the ringback queue call must return via a trunk group with an inferred AAR access code, the call does not complete to the remote PBX. In order for the calling station to receive ringback when a trunk becomes available, confirmation tone is returned from the local PBX to the station at the remote PBX. The calling party at the remote PBX then dials the calling extension number, which is stored at the local PBX for ringback purposes.

7.03 ***10-Digit Conversion:*** A call may route via AAR without a dialed AAR access code if the station user dials an ARS—Deluxe number that is subject to 10-Digit Conversion.

7.04 ***Attendant Control of Trunk Group Access:*** An AAR call does not route to an attendant controlled trunk group until all other possible routes are found unavailable. If an AAR call routes to an attendant when night station service is active, intercept tone or reorder tone is returned.

7.05 ***Station Message Detail Recording:*** When SMDR is used on an AAR call, the SMDR account code must be prefixed by an assigned single digit which distinguishes the full account code from an off-net number. Also, when an authorization code is dialed, it is recorded by SMDR. The authorization code dialed is stored in the called number field altering the data therein and affecting processing of SMDR data.

7.06 ***Advanced Private Line Termination (APLT):*** When an AAR call accesses an APLT trunk group, the call remains in the dialing state after the destination code has been outpulsed, and the calling party is cut-through to the trunk. This allows the calling party to dial the enhanced private switched communications service (EPSCS) network authorization code, if required. (This authorization code is completely different from the authorization code discussed in this section.)

8. RESTRICTION CAPABILITY

8.01 Access to AAR is controlled by the outward restriction status of a station line. If the station line is restricted from making outgoing calls, it is restricted from accessing AAR.

8.02 Access to the AAR routes is controlled by the FRL of the routes. The FRL of the origin of the call (station line, authorization code, attendant, incoming tie trunk, or TCM) must be equal to or greater than the FRL of the selected route in order to allow the use of the selected trunk group.

INCORPORATION INTO SYSTEM

9. INSTALLATION/ADDITION/DELETION

9.01 The following procedures are used to administer the Uniform Numbering Plan and AAR for the DIMENSION 600, 2000, and Custom PBXs. Table C provides a cross-reference between the

DIMENSION PBX system and the applicable MAAP procedures.

(a) ***Procedure 010, Word 2:*** This procedure is used to assign a FRL to a class of service for a station.

(b) ***Procedure 101:*** This procedure is used to indicate the application of AAR and SMDR for a trunk group.

(c) ***Procedure 103:*** This procedure is used to assign an FRL to an incoming trunk group, to specify if the trunk connects to a main or tandem PBX, to specify whether an authorization code is required on AAR calls placed by the incoming trunk, and to specify the implied AAR access code for incoming network trunks. It is used to administer incoming tie trunk access to AAR. It administers the number of trunks reserved for first-choice routing for AAR (trunk reservation limit).

(d) ***Procedure 200:*** This procedure is used to assign an FRL to the attendant console.

(e) ***Procedure 285:*** This procedure is used to assign the number of digits required in the location code and station extension number for the Uniform Numbering Plan. Administration of network type, SMDR account code prefix, reserved digit, and enabling of the Authorization Code feature are also done with this procedure.

(f) ***Procedure 281, 282, 283:*** These procedures are used to assign the authorization codes. More information on these procedures can be found in Section 554-191-229 (Authorization Code).

(g) ***Procedure 286:*** This procedure is used to assign the alternate FRLs.

(h) ***Procedure 321, Word 1:*** This procedure is used to define the routing patterns for AAR. It is used to assign a trunk group to a pattern and to define the trunk group's position (preference) in the pattern. It is used to assign an FRL to a pattern entry, to indicate if warning tone should apply to the pattern entry, to designate if the pattern entry is an off-net pattern entry, and to specify the number of digits deleted. It is used to define the existence of 0XXX stations at the destination switch. It also specifies whether or not the pauses defined in Procedure 321, Word 2, can be interrupted when a trunk signals readiness to receive digits (wink start or delay dial). Procedure 321, Word 1, contains an "off-net" field which defines the route as an off-net or IDDD route.

(i) ***Procedure 321, Word 2:*** This procedure is used to define the subnetwork trunking for a pattern entry. It defines up to four digit groups to be sent, the number of digits to be sent in each group, how they are sent (dial pulse or TOUCH-TONE service), and the pause length before sending each group.

(j) ***Procedure 321, Word 3:*** This procedure is used to define for a pattern entry the digits to be inserted when the call is routed via subnetwork trunking.

(k) ***Procedure 321, Word 4:*** This procedure is used to associate a location code with a pattern number for AAR routing.

(l) ***Procedure 350 Word 1 and Word 2:*** This procedure administers the single digit dial access code for access to AAR.

10. HARDWARE REQUIREMENTS

10.01 Subnet trunking requires a precise dial tone detector during digit sending (see paragraph 4.06, item 3). Therefore, LC12 TOUCH-TONE calling senders/dial tone detectors are required when subnet trunking is used.

TABLE C

MAAP PROCEDURES FOR ADMINSTERING THE UNIFORM NUMBER PLAN AND AAR FEATURES

TO ADMINISTER	IN "DIMENSION" 400E, 2000 AND CUSTOM PBX SYSTEMS USE	
	PROCEDURE	WORD
Facilities Restriction Level (FRL) to a class of service	010*	2
Application of AAR and SMDR for a trunk group.	101	—
(a) Assign FRL to incoming trunk group. (b) Specify if incoming trunk is from main or tandem PBX. (c) Requirement of authorization code on incoming calls placed by incoming trunk. (d) Specify AAR access code for incoming main or tandem trunks. (e) Incoming tie trunk access to AAR. (f) Number of trunks reserved for first-choice. (g) Routing of AAR (trunk reservation limit).	103*	—
Assign FRL to attendant console.	200	—
(a) Assign number of digits required in location code and station extension number for uniform numbering plan. (b) Network type. (c) SMDR charge code prefix. (d) Reserved digits. (e) Enable authorization code.	285*	
Assign alternate FRLs.	286*	—
(a) Define routing patterns for AAR. (b) Assign trunk group to a pattern. (c) Define trunk group's position (preference) in the pattern. (d) Assign FRL to a pattern entry. (e) Indicate if warning tone should apply to the pattern entry. (f) Designate if pattern entry is off-net. (g) Specify number of digits deleted. (h) Specify if pauses (Procedure 321, Word 2) can be interrupted when a trunk signal readiness to receive digits (wink start delay dial). (i) Display off-net field as follows: 0 = On-net route 1 = Off-net route 2 = IDDD route. (j) Indicates 0XXX stations exist at destination switch..	321*	1

* This feature is accessible via the CAP. Refer to Section 554-191-172 for CAP capabilities regarding individual procedures.

TABLE C (Contd)

MAAP PROCEDURES FOR ADMINSTERING THE UNIFORM NUMBER PLAN AND AAR FEATURES

TO ADMINISTER	IN "DIMENSION" 400E, 2000 AND CUSTOM PBX SYSTEMS USE	
	PROCEDURE	WORD
(a) Define subnet trunking for a pattern entry. (b) Define up to four digit groups to be sent. (c) Define number of digits to be sent in each group. (d) Specify how digits will be sent: dial pulse or TOUCH-TONE dialing. (e) Define pause length before sending each group.	321*	2
Define for a pattern entry the digits to be inserted when a call is routed via subnetwork trunking.	321	3
Associate a location code with a pattern number for AAR routing.	321	4
Dial access code for access to AAR.	350	—
These procedures are used to assign authorization codes. Refer to Section 554-191-229 (Authorization Code feature) for a detailed description of these procedures.	281, 282* and 283*	

* This feature is accessible via the CAP. Refer to Section 554-191-172 for CAP capabilities regarding individual procedures.